ABSTRACT OF THE INVENTION

A method of converting C_2 and/or higher alkanes to olefins by contacting a feedstock containing C_2 and/or higher alkanes with a first surface of a metal composite membrane of a sintered homogenous mixture of an Al oxide or stabilized or partially stabilized Zr oxide ceramic powder and a metal powder of one or more of Pd, Nb, V, Zr, Ta and/or alloys or mixtures thereof. The alkanes dehydrogenate to olefins by contact with the first surface with substantially only atomic hydrogen from the dehydrogenation of the alkanes passing through the metal composite membrane. Apparatus for effecting the conversion and separation is also disclosed.